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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,838	02/13/2002	Arunaya Majumdar	9840-066-999	2839
21839	7590	09/09/2005	EXAMINER	
BUCHANAN INGERSOLL PC (INCLUDING BURNS, DOANE, SWECKER & MATHIS) POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			CHEU, CHANGHWA J	
			ART UNIT	PAPER NUMBER
			1641	

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/076,838

Applicant(s)

MAJUMDAR ET AL.

Examiner

Jacob Cheu

Art Unit

1641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7,12-14,16-19,22 and 24-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-7, 12-14, 16-19, 22 and 24-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Applicant's amendment filed on 4/14/2005 has been received and entered into record and considered.

The following information provided in the amendment affects the instant application:

1. Claims 2, 8-11, 15, 19-21 and 23 are cancelled.
2. Currently, claims 1, 3-7, 12-14, 16-19, 22 and 24-36 are under examination.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 3, 5-7, 12-14, 16-18, 22, 25-27, 29-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Quate et al. (US 6436647).

Quate et al. teach using cantilever to measure micro-forces due to interaction between a predetermined substance and a sensing material that binds to the substance. Quate et al. teach using a cantilever palette comprising an interdigital array of cantilever where the cantilever palette includes a plurality of cantilever fingers surrounded by a frame with frame fingers, where each cantileverfinger in the array block comprising sensing

materials capable of interaction with the predetermined material, i.e. DNA hybridization (Col. 6, line 18-55; particularly see incorporated Manalis I reference, in Figure 1). Quate also teach that the detection of diffract grating to diffract light based on the interaction of the sensing materials with the predetermined substance (See claims 13-14, 18; Col. 5, line 19-55; Figure 2). There is no need of an external source of power for the cantilever palette since the detection is only on the reflection of the diffraction light due to the binding of the analyte materials on the cantilever. Supra. With respect to “visual” observing or indication, examiner takes the broadest definition of “visual” meaning *“relating to sense of sight, optical, or pertaining to a means of instruction utilizing sight”* (See Webster’s II New Riverside University Dictionary 1994) Accordingly, Quate et al. reference would read on the instant invention since Quate et al. using laser or photodiode to illuminate the cantilever to detect the diffraction light in response to the binding event. There is no “external power” connected to the cantilever, and the deflection of diffraction light is received and shown in the detector and “visualized” by the operator.

With respect to claims 3, 6, 27, 29-30, Quate et al. teach the substance of interests is DNA biomolecule (See Abstract). Quate et al. teach that immobilizing DNA probe on the cantilever to detect interested DNA molecule by the change of diffraction light on the cantilever (See Claim 18; Figure 2).

With respect to claims 5, 7, 16-18, Quate et al. teach that the cantilever apparatus can be used to detect various analytes of interests including, DNA, protein, peptide and carbohydrates (See claims 5-9).

With respect to claim 22, Quate et al. teach that the sample can be of liquid (Col. 5, line 18-25; Figure 2).

With respect to claims 25-26 and 31, Quate et al. teach that measuring the changes in intensity of the diffraction light as an indication of the binding of the target molecules in the samples (See claims 13-14, 18).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 4, 24, 28 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quate et al. in view of Thundat et al. (US 6289717).

Quate et al. teach that the cantilever apparatus can be used to detect protein, peptides and DNA biomolecules. However, Quate et al. do not explicitly teach using antigen-antibody relationship to detect antigen.

Thundat et al. teach immobilizing antigen or antibody on the cantilever to determine the light diffraction from the cantilever surface due to the binding of antigen-antibody (Col. 6, line 60-68 to Col. 7, line 1-9).

Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to have provided Quate et al. with the immobilized antigen or antibody on the cantilver to detect antibody/or antigen based on the binding relationship since detection of different biomolecules, such as DNA, proteins, peptides or carbohydrates have been taught by Quate et al. based on the binding relationship, i.e. hybridization of DNA probe, and using antigen-antibody is well-known in the art and teachings of Thundat et al. is also a close analogous art field, i.e. cantilever detection.

Response to Applicant's Arguments

Applicant's arguments with respect to claims 1, 3-7, 12-14, 16-19, 22 and 24-36 have been considered but are moot in view of the new ground(s) of rejection.

External Power

The instant invention recites that the *cantilever palette does not require an external electrical power source* (emphasis added). Examiner has established that Quate et al. reference teach the detection of diffraction light on the cantilevers based on the binding of DNA probes to the target DNA molecules. This measuring event, for the cantilever per se, does not require external power to the cantilevers. Contrast to the conventional AFM (atomic force microscopy) cantilever, such as Atalar et al. (US 5908981), the measuring of vibration or resonance does need applying external source of electrical power. The light (e.g. laser beam) illuminates on the cantilver palette taught by Quate et al. is not an external source of electrical power (e.g. electron source for moving or vibrating cantilevers). Thus, the teachings of Quate et al. can be performed without providing an external source of electrical power for the cantilever palette.

Conclusion

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6. No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Cheu whose telephone number is 571-272-0814. The examiner can normally be reached on 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jacob Cheu
Examiner



Art Unit 1641

August 3, 2005



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08/06/05